

New Species of *Ceradenia* subg. *Ceradenia*

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When establishing the genus *Ceradenia* (Bishop, 1988), I noted that many taxa were yet to be described. Since the number of novelties will be a surprise to some workers, a few words of explanation seem appropriate. First of all, until recently no group of Neotropical Grammitidaceae has been studied thoroughly using all the nomenclaturally important material. Furthermore, it is now apparent that different species may be superficially quite similar even though they belong to distantly related groups. As a result, the application of some nineteenth century names has been somewhat hazy, for most of the work in this century on these ferns has been done in the New World whereas the types for the older names are in Europe. And of course the descriptions published for these older names have been of little help to modern students. Therefore, specimens of undescribed species have lain in herbaria unrecognized because of the difficulty in ascertaining the precise application of published names. Lastly, these ferns appear to be inadequately collected and many are known only from their types. Parris' careful study of the genus *Grammitis* in New Guinea (1983) provides an illustrative case; of 64 species accepted 21 were new.

Subgenus *Ceradenia* has been the easier of the two in which to elucidate the included taxa. Subgenus *Filicipecten* includes the large *C. kalbreyeri-meridensis* group, which in complexity and similarity of species seems analogous to the *Polypodium vulgare* complex of the Northern Hemisphere. The novelties of this subgenus will be treated later.

The eight new species in subgenus *Ceradenia* here described fall into three species alliances. Five are related to *C. capillaris*, a widespread species that erenow had but one closely allied described species. A single species falls with the small group of species near *C. pilipes*. The two remaining species, which are the first terrestrial, erect ones in the subgenus, are closely related to *C. herrerae*, which in turn seems allied to *C. albidula*.

I have standardized and simplified certain morphological terms in their application to grammitid ferns. I use "rachis" and "pinna" whether the lamina is pinnatifid or pinnate. The difference between these two states of laminar dissection is often small or even obscure in many Grammitidaceae. The costa is the midrib of the pinna, the vein is the primary branch from the costa, and the veinlet (venula) is the branch of a forked vein. Of the trichomes, a hair (pilus) consists of one or more thin-walled cells and may be branched or simple, a seta is a pluricellular, unbranched, acicular trichome with thickened cell walls (the multicellular nature is not normally discernible except under higher magnification), and a gland or glandular hair is any trichome that includes one or more cells that are clearly internally or externally secretry.

Unless otherwise noted, I have examined all specimens cited. Loans were obtained from AAU, B, BM, F, GH, K, MO, NY, P, and US, and I thank the curators for making these specimens available.

Ceradenia dendrodoxa L. E. Bishop, sp. nov. (Fig. 1A)—TYPE: Peru, Amazonas, Pcia. Chachapoyas, Cerros de Calla-Calla, near Kms 403–407 of Balsa-Leimebamba road, on uppermost slopes and summit, pendent from tree branches in moist ravine, occasional, 3400–3550 m, 18 Aug 1962, Wurdack 1715 (holotype UC, isotypes F, NY, US).

Ab altitudine excelsa haec filix amoena plerumque epiphytica pendulaque oritur. Rhizoma est breve ramosum caespitosum paleis castaneis lineari-oblongis vel lineari-triangularibus, basi truncatis vel subcordatis apice abrupte vel acuminate angustatis $2.0\text{--}4.5 \times 0.2\text{--}0.4$ mm ciliis nullis autem glandulis marginalibus caducis, cellulis medialibus $50\text{--}140 \times 25\text{--}35$ μm . Frondium sunt stipites nigri in senectute brunnei glandulosi esetosi teretes $0.3\text{--}0.5$ mm lati 2–6 cm longi rhachides similiter teretes nigrae glandulosae setis carentes rectae vel flexuosae, laminae perpinnatae usque ad 75 cm longae pinnis sub angulo $25\text{--}40^\circ$ a rhachide abeuntibus linearibus marginibus propter expansionem laminae circum soros repandis ad basim aut ad costam ab utroque latere constrictis aut rectis sine constrictionibus apice rotundatis vel acutis pilis glandulosis in paginis ambabus dispersis $1\text{--}4$ cm \times $1.0\text{--}1.5$ mm costae sclerenchymate nigro dorsaliter clare evidenti, venis simplicibus aut furcatis, stomatibus $50\text{--}60 \times 44\text{--}50$ μm . Sori usque ad 20 paria in quaque pinna capsulis $155\text{--}170 \times 135\text{--}142$ μm annulis ex 10–12 cellulis constantibus illis cellulis distalibus $28\text{--}34$ μm altis sporis subglobosis vel hemisphaericis $27\text{--}32$ μm in diametro longiore sub maturitate marginem excedunt.

Haec species tam grandis et insignis est certe gloria cuiuscunque arboris quam forsitan incolat.

Paratypes: **ECUADOR. Azuay.** Rio Collay, slopes of Huagrarancha, S of El Pan, 2650–3290 m. Steyermark 53380 (F, US). **Loja?** Horta-Naque, 3600 m, Espinosa 1021 (NY, US). **PERU. Húanuco.** Tambo de Vaca, 13000 ft., Bryan 626 (F, US).

This splendid, high-elevation species is known from a relatively wide range through southern Ecuador and northern Peru. The black rachis and the narrow pinnae that never show prolonged growth ally it to the *C. capillaris* group. From the widespread *C. capillaris* itself, which occupies the same range at lower elevations, it differs in its completely pinnate fronds. It appears most closely related to *C. praeclara* of central Peru, but that species has much wider pinnae whose margins the sori do not exceed. Both *C. praeclara* and *C. auroseiomena* bear setae on the stipe and rachis; such setae are absent in *C. dendrodoxa*. The insertion angle of the pinnae onto the rachis is narrower in *C. dendrodoxa* than any related species.

On the basis of the few gatherings at hand, the Ecuadorian plants differ somewhat from the Peruvian population. These northern specimens have the pinnae smaller, of thinner texture, and more regularly constricted at the base. Moreover, the rachis is thinner and is more sharply, conspicuously flexuous.

Ceradenia comosa L. E. Bishop, sp. nov. (Fig. 1B)—TYPE: Bolivia, Cocopunco, 10,000 ft, 24–29 Mar 1926, Tate 337 (holotype NY, isotype US).

Haec filix delicatula manifeste pendula verisimiliter in arboribus epifitice viget. Rhizoma secundum exemplum unicum praesens est minus breve paulo ramosum, paleis parvis atrocastaneis anguste triangularibus ad basin plerumque pallidum truncatis vel subcordatis apice acuminatis $1.5\text{--}2.5 \times 0.1\text{--}0.3$ mm marginibus per maximam partem ciliatis pilis concoloribus vel pallidioribus sed non hyalinis, cellulis medialibus $28\text{--}35 \mu\text{m}$ latis et 3–5plo longioribus quam latioribus. Frondium sunt stipites teretes brunneoli (fortasse corylinus) setis exilibus castaneis $0.5\text{--}1.5$ mm per longitudinem totam etsi ad basin confertioribus etiam sub juventa pilis parvis hyalinis 1–3-furcatis praediti $0.2\text{--}0.3$ mm lati 5–10 cm longi, rhachides stipitum similes sed setis carentes sub juventa glandulis dissitis instructae demum eis obscuris, laminae perpinnatae 22–40 cm longae base multum angustatae pinnis linearibus sub angulo $40\text{--}70^\circ$ a rachide abeuntibus irregulatim elongatis usque ad 15 cm longis $0.7\text{--}1.5$ mm latis repandis vel dentatis dentibus acutis antrorsis basi non constrictis basiscopice decurrentibus apice truncatis vel rotundatis primum glandulas parvas in paginis ambabus exigue ferentibus demum his glandulis vix visibilibus in margine aliquot pilis hyalinis dissitis 1–3-cellulatis praeditis venis regulatim simplicibus sed aliquando furcatis dorsaliter costa paulo evidenti sed sclerenchymate suo haud exposito stomatibus $54\text{--}62 \times 45\text{--}54 \mu\text{m}$. Sori usque ad 20 paria in quaque pinna sub maturitate marginem paulo excedentes capsulis oblongis vel subglobosis $152\text{--}168 \times 132\text{--}145 \mu\text{m}$ annulis ex 12–13 cellulis constantibus illis cellulis distalibus $30\text{--}36 \mu\text{m}$ altis sporis subglobosis vel hemisphaericis $26\text{--}32 \mu\text{m}$ in diametro longiore in laminae expansionibus vel dentibus medialiter geruntur.

Hanc speciem gracilem ob aspectum capillarem et pendulum nomino.

This is yet another rather large, delicate, pendent novelty from high elevations. However, it is immediately separable from other such pinnate, South American species in the subgenus (*C. auroseiomena*, *C. dendrodoxa*, *C. praeclara*) by its brown rachis. This feature seems to ally it more closely to the *C. pilipes* group. The rather irregularly elongate pinnae and the very much reduced, barely evident basal pinnae are also characteristic of these species. Among this group of species, which also includes *C. fucoides* and *C. podocarpa*, *C. comosa* is the only one with fully pinnate fronds.

The locality "Cocopunco" is somewhat in question. There is the small settlement of Cocapunco on the east bank of Río Challana, ca. 30 km downstream from Callana, Dpto. La Paz, Pcia. Larecaja. However, this locality is at 1400 m and there are no mountains of the given height within at least 25 km.

Ceradenia praeclara L. E. Bishop, sp. nov. (Fig. 1C)—TYPE: Peru, Ayacucho, Cochapata, Valle de San Miguel, La Convención, 10,300 ft, Sep 1934, Bües 2179 (holotype US).

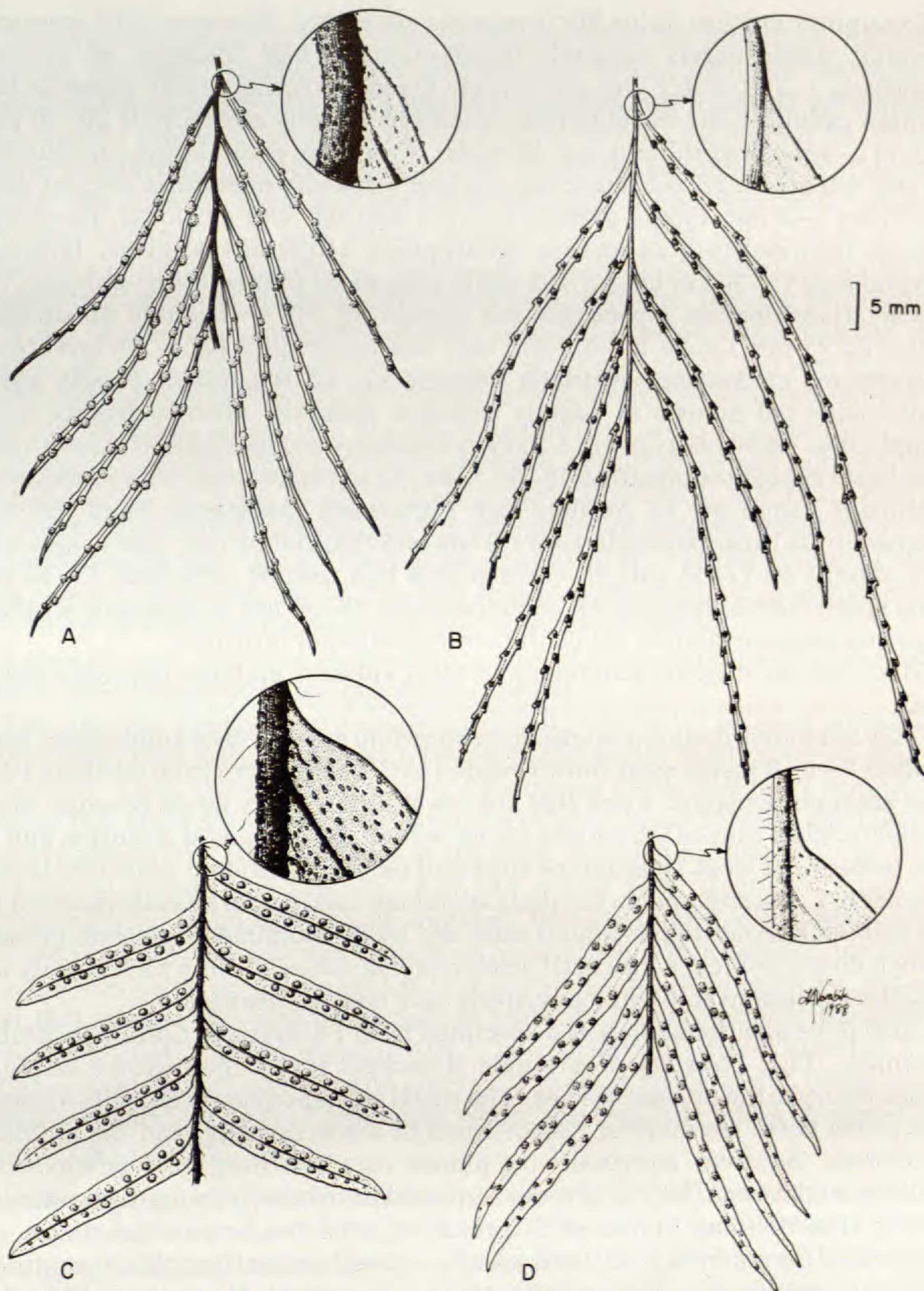


FIG. 1. A, *Ceradenia dendrodoxa*, Wurdack 1715, UC. B, *C. comosa*, Tate 337, NY. C, *C. praeclara*, Bües 2179, US. D, *C. auroseiomena*, Little 9363, US.

Exemplum unicum huius filicis regionis altae novi. Rhizoma mihi praesens simplex, paleis parvis castaneis lineari-oblongis basi truncatis ad apicem angustatis $1-2 \times 0.1-0.2$ mm sub juventa glandulis marginalibus praeditis his demum caducis ciliis marginalibus carentibus cellulis medialibus $20-30 \mu\text{m}$ latis et 2-4plo longioribus quam latioribus. Frondium pendularum sunt stipites teretes nitentes nigri sub senectute brunnei glandulis numerosis necnon setis debilibus 1-2 mm longis praediti 0.3-0.5 mm lati 1-3 cm longi, rhachides quoad indumentum aspectum coloremque stipitibus similes, laminae perpinnatae 15-30 cm longae basi paulo angustatae pinnis lineari-oblongis vel lineari-triangularibus repandulis sub angulo $50-70^\circ$ a rhachide abeuntibus usque ad 25 mm longis 3.0-4.5 mm latis basi basiscopice paulo decurrentibus acroscopice conspicue constrictis margine hic ad rhachidem parallo apice rontundatis vel obtusis in paginis ambabus glandulis uberius dissitis venis simplicibus perve occasionem 1-furcatis dorsaliter costae sclerenchymate nigro manifeste exposito stomatibus $48-56 \times 44-52 \mu\text{m}$ ventraliter costa prominula. Sororum usque ad 15 paribus sub maturitate marginem haud vel vix attengentium capsulis subglobosis vel late obpyriformibus $145-160 \times 130-145 \mu\text{m}$ annulis ex 12-14 cellulis constantibus illis cellulis distalibus $25-30 \mu\text{m}$ altis sporis hemisphaericis vel subtetraedricis $25-30 \mu\text{m}$ in diametro longiore quaeque pinna medialiter vel paulum inframedialiter instruitur.

Haec species insignis propriaque ut mihi videatur epithete praeclaro digna est.

This attractive, distinctive species is known to me only by a single sheet from central Peru. It seems most closely related to *C. dendrodoxa* from northern Peru and southern Ecuador. From that species it differs in its much broader, more widely angled pinnae whose sori do not exceed the margins at maturity, and in the presence of weak setae on the stipe and rachis. *Ceradenia praeclara* is also similar to *C. auroseiomena*, but that Colombian species can be distinguished by its more numerous, rather stouter setae and by its acuminate, narrower pinnae, which do not evidence the costal sclerenchyma dorsally and which basally are slightly surcurrent acroscopically, never here deeply constricted.

Also to be mentioned here is a specimen from Fusagasuga, Colombia, Stübel 489a(B). This consists of a single detached frond that shows obvious relationship to the present species. The costal sclerenchyma is dorsally evident, the pinna bases are more or less constricted acroscopically, and the rachis is setiferous. However, marginally the pinnae vary from deeply sinuate to lobed halfway to the costa, they are evenly narrowed from base to tip (in contrast to the nearly linear-oblong pinnae of *C. praeclara*), and the lamina and rachis are noticeably less densely set with glands. I feel certain that this incomplete specimen represents a species distinct from *C. praeclara*. However, until further material is discovered, preferably of both species, I decline to describe it formally.

Ceradenia auroseiomena L. E. Bishop, sp. nov (Fig. 1D)—TYPE: Colombia, Caquetá, hanging down from wet limb, wet temperate forest, Caquetá side of Huila—Caquetá divide, Cordillera Oriental, 20 km SE of Garzón, 7800 ft, 2 Feb 1945, Little 9363 (holotype US).

Unum specimen solum huius filicis gracilis epiphyticae mihi adest. Rhizoma unicum praesens simplex paleis atrocastaneis lineari-oblongis vel lineari-triangularibus $1.0-2.5 \times 0.2-0.4$ mm basi pallidioribus truncatis vel cordatis marginaliter primo glanduliferis postea integris, cellulis medialibus $25-35 \mu\text{m}$ latis et 1-3plo longioribus quam latioribus. Frondium pendularum sunt stipites teretes ubi juvenes nigri sub maturitate brunnei aliquot glandulis setisque pluribus castaneis 1-2 mm longis praediti $0.2-0.3$ mm lati 4-8 cm longi, rhachides stipitibus similes sed nigrae sub maturitate permanentes solum ad senectutem brunneae praeterea setas pauciores praebentes, laminae perpinnatae 2-4 dm longae basi angustatae pinnis repandulis lineari-triangularibus sub angulo $50-70^\circ$ a rhachide abeuntibus usque ad 35 mm longis 2-3 mm latis basi basiscopice decurrentibus acroscopice paulo surcurrentibus apice acuminatis in paginis ambabus glandulas dispersas gerentibus venis simplicibus (rare 1-furcatis) dorsaliter costa prominula autem sclerenchymate suo non exposito stomatibus $44-50 \times 44-50 \mu\text{m}$ ventraliter costa vix evidenti. Sororum usque ad 12 paria sub maturitate marginem vix attangentium capsulis subglobosis vel obpyriformibus $142-160 \times 120-140 \mu\text{m}$ annulis ex 12-13 cellulis constantibus illis cellulis distalibus $26-32 \mu\text{m}$ altis sporis subglobosis vel hemisphaericis $22-28 \mu\text{m}$ in diametro longiore quaeque pinna medialiter fert.

E graecor $\alpha\nu\alpha$, ventulus, et $\sigma\epsilon\iota\omicron\mu\epsilon\nu\eta$, tremefacta, hoc epitheton pro tali specie subtili pendulaque stipitibus gracilibus contraxi.

This species, known from a single specimen, apparently grows at somewhat lower elevations than its nearest relatives to the south, *C. dendrodoxa* and *C. praeclara*. From these it differs in its dark brown scales and in its acuminate pinnae that show no exposure of the costal sclerenchyma dorsally and that are slightly surcurrent acroscopically at the base. *Ceradenia praeclara*, the more similar of these two species, has the pinna base deeply contracted acroscopically, in addition to its rounded, broader pinnae with prominently exposed costal sclerenchyma. *Ceradenia dendrodoxa* has no setae on the rachis or stipe, has narrower, linear pinnae with exposed costal sclerenchyma, and has sori that exceed the laminar margin at maturity. It may be that the closest relationship of *C. auroseiomena* is with *C. phloiocharis* of Central America. This latter species is more gracile, with ciliate scales and with narrower, linear, more deeply repand pinnae (1-2 mm wide) whose sori regularly attain or exceed the margins at maturity.

Ceradenia phloiocharis L. E. Bishop, sp. nov. (Fig. 2A) ✓ TYPE: Panama, Bocas del Toro, headwaters of Río Colubre (Colubre camp), 2400-2550 m, 3 Mar 1984, Gómez, Chacón, Davidse, & Herrera 22372 (holotype UC, isotype MO).

Haec filix gracilis pendulaque sylvas pluviales orientales panamanas et costaricenses amat. Rhizoma simplex vel pauciramosum, paleis atrocastaneis lineari-triangularibus $1.0-1.5 \times 0.1-0.3$ mm basi pallidiori truncatis vel subcordatis margine ciliis longioribus coloratis necnon sub juventate glandulis praeditis, cellulis medialibus $25-35 \mu\text{m}$ latis et 1-4plo longioribus quam latioribus. Frondium sunt stipites teretes ubi juvenes nigri sub maturitate brunnei aliquot glandulis setisque pluribus castaneis 1.0-1.5 mm longis

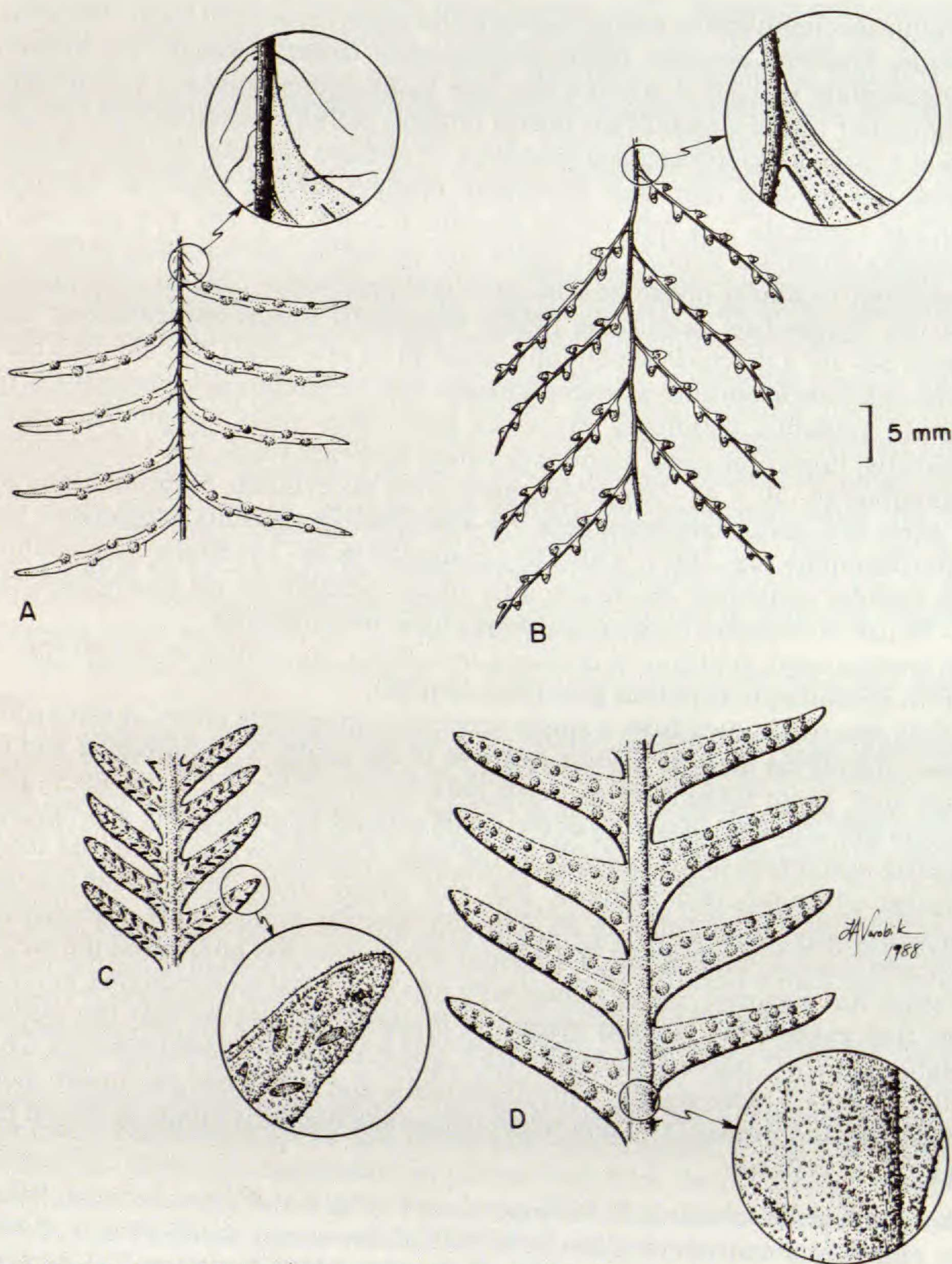


FIG. 2. A, *Ceradenia phloiiocharis*, Gómez et al. 22372, UC. B, *C. mirabilis*, Brooke 6134, BM. C, *C. terrestris*, Wurdack 1643, US. D, *C. maxoniana*, Lehmann 2400, US.

instructi 0.2–0.3 mm lati 2–8 cm longi, rhachides stipitibus similes sed nigrae sub maturitate permanentes solum ad senectutem brunnescentes etiam setas pauciores praebentes, laminae perpinnatae 10–45 cm longae basi gradatim angustatae pinnis repandis linearibus sub angulo 50–80° a rhachide abeuntibus usque ad 4 cm longis 1–2 (2.5) mm latis 2–4plo latitudine sua inter sese

disjunctis basi basiscopice decurrentibus acroscopice paulo surcurrentibus apice acuminatis in paginis ambabus glandulas dispersas ferentibus venis vulgo simplicibus interdum 1-furcatis dorsaliter hic illic setiferis costa venisque prominulis ac sclerenchymate costali visibili sed rare exposito stomatibus $44\text{--}52 \times 38\text{--}44 \mu\text{m}$ ventraliter costa venisque prominulis. Sori in quoque segmento usque ad 15 paria sub maturitate marginem attengentes vel excedentes capsulis late obpyriformibus $144\text{--}160 \times 115\text{--}135 \mu\text{m}$ annulis ex 10–12 cellulis constantibus illis cellulis distalibus $28\text{--}34 \mu\text{m}$ altis sporis subtetraedricis vel hemisphaericis $25\text{--}30 \mu\text{m}$ in diametro longiore medialiter feruntur.

E graeco φλοιος, cortex, et χαρις, venustus, epitheton conformatum est ut hanc speciem elegantem epiphyticam tali modo celebrarem.

Paratypes: **COSTA RICA. Limón.** Cordillera Talamanca, between Río Siní, 2–4 km W of Panamanian border, 2300–2500 m, *Davidse, Herrera, & Grayum* 28979 (MO, UC), 28980 (MO). **PANAMA. Bocas del Toro.** Cordillera de Talamanca, 4 km NW of main peak of Cerro Fabrega, 3000–3150 m, *Davidse et al.* 25393 (MO). Headwaters of Río Colubre, 2400–2550 m, *Gómez et al.* 22353 (MO), 22430 (MO).

This elegant, slender species is apparently fairly common at appropriate elevations in a small area of the Atlantic slope near the Costa Rican–Panamanian border. The delicate fronds with linear, acuminate pinnae are quite distinctive. The two most closely related species seem to be *C. auroseiomena* of Colombia and *C. nubigena*. The former differs in its eciliate rhizome scales and in its wider (2–3 mm) pinnae that are broadest at the base (linear-triangular) and only lightly repand. *Ceradenia phloiiocharis* has linear pinnae 1–2 mm wide that are repand to the point of being subsinuately lobed. *Ceradenia nubigena* is a moderately variable species very nearly restricted to the summit area of Blue Mountain on Jamaica. The pinnae are generally more than 2 mm wide, they are normally rather abruptly rounded at the apex, they are usually separated on the rachis by no more than their own width, and the rachis is regularly and at least very narrowly alate between the pinnae. The pinnae of *C. phloiiocharis* are always acuminate on mature fronds (though perhaps rounded when juvenile and sterile), they are usually separated on the rachis by two or more times their own width, and the rachis is completely terete between the pinnae. The scattered but fairly regular presence of setae on the lamina of *C. phloiiocharis* is unique among the species of the *C. capillaris* group.

Two Costa Rican collections from the province of San José merit mention here. Both have black rachides that are quite exalate between the pinnae, but I believe neither to be conspecific with *C. phloiiocharis*. Valerio 53 (US, 2 sheets) from Volcán Barva (Barba) is a collection mixed with *C. fucoides*, but the plants of interest here are relatively robust and have large pinnae that are sharply dentate. This frond pattern is closely matched by at least one of the many sheets of *C. nubigena* at hand (*Sherring s.n.*, US). Like typical *C. nubigena* and *C. phloiiocharis*, the rachis bears scattered setae. Since the rachis ala in *C. nubigena* may at times be scarcely detectable, I prefer at this time to refer this collection to that species, realizing that as such it represents the only record outside the Jamaican locality.

The other specimen from central Costa Rica (Cerro Chiripo, *Evans & Lellinger* 78, US) is also a mixed collection, with two detached fronds of *Grammitis*

jamesonioides (Fée) C. Morton and one plant of interest here. This has abruptly rounded or acute pinnae that are rather small, though well within the size range of *C. nubigena*. However, the rachis is devoid of setae, which is at least not typical of the Jamaica species. More critically, the base of the pinna on the basiscopic side is contracted completely to the costa before the latter's insertion onto the rachis. This last character I have seen only in the Ecuadorian population of *C. dendrodoxa*. I strongly suspect this plant represents yet another undescribed, probably localized species likely related to *C. capillaris*, which likewise lacks setae on the rachis but which does not occur in Mesoamerica. However, because of the small distinctions involved, I prefer not to establish a new species based on this specimen until a greater range of material can be obtained.

Ceradenia mirabilis L. E. Bishop, sp. nov. (Fig. 2B)—TYPE: Bolivia, Cochabamba (?), Carmen, 5–10 mi down the valley from Choro, 17° S, 66° 50' W, hanging from a tree in warm wet forest, 8000 ft, 11 Feb 1950, W. M. A. Brooke 6134 (holotype BM, isotypes NY, US; U not seen).

Filix subtilis quae in altitudinibus mediocribus epiphytice crescit. Rhizoma simplex paleis palidis linearibus $0.5-1.0 \times 0.03-0.1$ mm tantum 1–3 cellularum latitudine ubi juvenibus glandulis numerosis marginaliter praeditis, cellulis $40-80 \times 35-50$ μm . Frondium pendularum sunt stipites capillares teretes sub juventute nigri mox brunnescentes glandulis multis displicatis setis nullis intructi $0.1-0.2$ mm lati 1–3 cm longi, rhachides stipitibus similes sed nigrae sub maturitate permanentes solum ad senectutem brunnescentes, laminae bipinnatae 15–30 cm longae ad basim de medio angustatae pinnis sublineares sub angulo $30-60^\circ$ a rhachide abeuntibus basi parallela decurrentibus, usque ad 25 mm longis et 8 paribus pinnulis spathulatis antrorsis acutis obtusis vel bilobatis 2×1 mm in pagina utraque glandulas albidis adpressis ut videtur ex 2–4 cellulis constantes gerentibus vena in quaque pinnula simplici aut furcata dorsaliter sclerenchymate costali pinnae plerumque exposito stomatibus $36-45 \times 32-42$ μm . Sorus in quaque pinnula unicus sub maturitate latitudinem segmenti excedens capsulis globosis vel late obpyriformibus $172-200 \times 160-180$ μm annulis ex 12–14 cellulis constantibus illis cellulis distalibus $28-32$ μm altis sporis subglobosis vel sub tetraedricis $36-44$ μm in diametro.

Epitheton *mirabilis* elegi ut characteres singulares non solum laminam bipinnatum set etiam paleas filiformes huius speciei celebrarem.

At hand are three sheets of this remarkable species. The holotype and the NY isotype represent complete plants, while the US specimen consists of detached fronds from an example at Utrecht. The collection date on the NY sheet reads Feb. 2 1950, undoubtedly a misinterpretation of the date on the attached label tag, 11.2.50. The US sheet gives the elevation as 6000 ft, which will be considered in connection with the collecting locality. All the specimens at some place bear the collection number as 6134a, though the letter has been crossed out on all except the US sheet. At this time I assume the corrected number to be the accurate one.

Two of these sheets posit that a new species may be represented. Of the three other determinations suggested, *Polypodium pozuzoense*, *P. microphyllum*, and *P. pseudocapillare*, only the first represents a congeneric species (*P. pozuzoense* = *C. pilipes*).

The precise locality of collection is open to question. There is a small town of Choro or El Choro 2 km NE of Cocapata, Dpto. Cochabamba, 2500 m, at 16° 56' S, 66° 42' W. This is clearly close enough to the coordinates given to be almost certainly the Choro referred to. Carmen is a common geographical name in Bolivia; one gazeteer cites 54 such names within the country. Unfortunately none are close to the locality under consideration. Also, just which valley is meant on the label depends on the actual distance from Choro. The Río Cocapata flows past the town of that name WNW about 10 km to join with the Río Ayopaya (Río Inquisivi). After this confluence the river flows north as the Río Cotacajes. About 40 km along this last river is the Arroyo Carmen, but this is patently too distant from Choro to be the locality mentioned on the label. Also it is puzzling, if the collection site were some miles down the valley, as to why the much better known settlement of cocapata was not used as the reference point. In any case, we would expect at this distance down the valley, the elevation would be significantly lower than that of Choro (8200 ft), so that the elevation given on the US sheet (6000 ft) may be the correct one.

This is the only species of the genus showing bipinnate fronds. The filiform paleae are likewise singular in that they are regularly only one or two cells wide. Otherwise, *C. mirabilis* fits quite well within the group of *C. capillaris*, which now also includes *C. nubigena*, *C. phloiocharis*, *C. auroseiomena*, *C. dendrodoxa*, and *C. praeclara*. Among these species the nearest relative would seem to be *C. dendrodoxa*. This is the only other species of the alliance that lacks setae on both the stipe and rachis. Furthermore, these two species are similar in the narrow angle of insertion of the pinnae on the rachis, the parallel, decurrent pinnae bases, and the dorsally exposed costal sclerenchyma. It should be noted, however, that *C. mirabilis* has distinctly larger sporangial capsules and spores than the other species of the *C. capillaris* group, which are otherwise fairly uniform in this regard.

Ceradenia terrestris L. E. Bishop, sp. nov. (Fig. 2C)—TYPE: Peru, Amazonas, Pcia. Chachapoyas, moist scrub forest on south side of Monlinopapa-Diosan pass, on moist bank, 2700–3100 m, 8 Aug 1962, Wurdack 1643 (holotype US).

Speciminem singularem speciei terrestris strictae insolitae inveni. Rhizoma ramosus caespitosum, paleis castaneis lineari-triangularibus, basi cordatis vel subcordatis apice gradatim angustatis $2-5 \times 0.2-0.4$ mm in margine ciliis brevibus displicatis concoloribus vel pallidioribus, cellulis medialibus $100-170 \times 25-35$ μ m. Frondium erectarum sunt stipites brunnei dense glandulosi demum glabrescentes basi teretes distaliter propter laminam decurrentem alati 0.6–0.9 lati 1–2 cm longi, rhachides alatae dense glandulosae vulgo sclerenchymata suo haud expositae, laminae pinnatifidae lineari-ellipticae basin versus paulatim angustatae apice auctu diuturno demum obtusae vel

rotundatae 8–15 cm longae pinnis subfalcatis lineari-oblongis sub angulo 30–50° a rhachide abeuntibus per basin decurrentem ampliatis apice rotundatis vel obtusis pilis glandularibus in utraque pagina uberrime praeditis 8–13 × 1.5–2.0 mm costa dorsaliter prominula ventraliter haud evidenti venis ordinate 1-furcatis stomatibus 48–60 × 42–52 μm . Sori usque ad 10 paria in quaque pinna vulgo ad apicem breviter sterilem carentes eis in utroque latere costae in sulculum communem saepe impressi capsulis oblongis vel obpyriformibus 180–200 × 165–180 μm annulis ex 13–15 cellulis constantibus illis cellulis distalibus 35–40 μm altis sporis subglobosis vel hemisphaericis 32–38 μm in diametro longiore medialiter disponuntur.

Habitationis insolitae causa nomen pro hac specie singulari dilexi.

Among the species of the subgenus, only *C. maxoniana* shares with this species the terrestrial habitat and the erect fronds. The sandy soil around the rhizome of *C. terrestris* indicates that it is not simply growing among epigaeal bryophytes but has actual contact with the ground. *Ceradenia maxoniana* may be separated by its much larger fronds, more widely spreading pinnae, less densely glandular lamina, and the dark brown, eciliate scales.

The other species apparently related here is *C. herrerae*. This is a rare species which I know only from three collections from central Peru and two from Colombia. This species is intermediate in size and density of the laminar indument between *C. terrestris* and *C. maxoniana*. Like the latter this species has widely spreading pinnae, a scarcely evident dorsal costa, and dark, eciliate scales. It differs from both the related species here described by its pendent fronds and by the rachis when exposed dorsally being dark brown.

Ceradenia maxoniana L. E. Bishop, sp. nov. (Fig. 2D)—TYPE: Colombia, Tolima, auf moorigen Boden an den oberen Westgehängen des Alto de Oterras (Alto de las Oseras?), 3000–3400 m, 11 Jan 1883, Lehmann 2400 (holotype US, isotype B).

Haec species paramicola in montibus excelsis Colombiae centralis saltem existit. Rhizoma repens vel ascendens est simplex (quoad exemplum unicum), paleis atrocastaneis anguste triangularibus, basi cordatis vel subcordatis apice acuminatis 1–2 × 0.2–0.3 mm margine eciliatis, cellulis medialibus 25–40 μm latis 1–4plo longioribus quam latioribus. Frondium erectarum sunt stipites brunnei glandulis indistinctis uberius praediti fortasse sub senectute glabri 0.9–1.1 mm lati 3–5 cm longi, rhachides alatae dense glandulosae glandulis subtranslucidis dorsaliter brunneae, plerumque non evidente fuscatae, laminae pinnatifidae lineari-ellipticae ad basim redactissimae apice auctu diuturno (auctu completo non mihi viso) longitudine usque ad plus quam 40 cm pinnis lineari-oblongis vel lineari-triangularibus sub angulo 60–80° a rhachide abeuntibus per basin decurrentem ampliatis apice anguste rotundatis vel obtusis glandulis translucidis in paginis ambabus dissitis demum saepe glabris 10–20 × 3–4 mm costa dorsaliter vix evidenti ventraliter prominula venis vulgo 1-furcatis interdum venula fertili ad venum distalem conjuncta etiam nonnunquam venula sterili denuo furcata stomatibus 46–52 × 40–48 μm .

Sororum usque ad 12 paria capsulis oblongis vel obpyriformibus $180\text{--}200 \times 140\text{--}160 \mu\text{m}$ annulis ex 12–13 cellulis constantibus illis cellulis distalibus $30\text{--}35 \mu\text{m}$ in diametro longiore quaeque pinna medialiter vel paulo supramedialiter praebet.

Ad honorem clarissimi W. R. Maxonii qui adnotaverat hoc specimen repraesentare speciem novam hoc taxon laetabiliter dedico.

This represents a second species of the subgenus with a more or less terrestrial habitat and erect fronds. From the Peruvian *C. terrestris* it differs in its larger size, its straight, more widely spreading pinnae, its less dense glandular indument, and its costae that are scarcely evident dorsally but distinctly prominulous ventrally.

A much closer relationship seems to exist with *C. herrerae*. Apart from the narrower stipes (0.5–0.8) and pendent fronds, almost the only differentiation I have been able to make is in the tendency of the laminar trichomes of *C. herrerae* to remain white through frond maturity, while those of *C. maxoniana* soon become somewhat translucent and considerably less conspicuous.

The original collection included examples of both *C. maxoniana* and *C. herrerae*. The US holotype consists solely of the former, a sheet at BM holds a single plant of the latter, and the specimen at B shows a single detached frond of each species. It is clear that the label notation "Laub . . . steht aufrecht" cannot apply to the slender, rather flexed stipes of *C. herrerae*, nor probably the reference to the habitat on open páramo ("auf moorigen Boden"). It seems likely that we have here two very closely related species, one growing upright in bryophyte mats of the páramo and the other an epiphyte in the adjacent cloud forest.

With regard to Lehmann's locality, I take it to be a misreading of Alto de las Oseras, the peak of which is near the juncture of the borders of the departments of Cundinamarca, Huila, and Tolima. The only other peaks in Tolima of requisite height occur on the western border, so that their western slopes would not lie within the indicated department.

LITERATURE CITED

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Note added in proof.—A recent loan for determination included another example of *Ceradenia mirabilis*: **PERU. Ancash.** Huaraz, Huascarán National Park, Quebrada Llaca, $77^{\circ}27'W$, $9^{\circ}27'S$, 4090 m, in organic matter between boulders, Smith & Buddensiek 11142 (MO). This collection is the first from Peru and represents a disjunction of ca. 2000 km from the type locality.